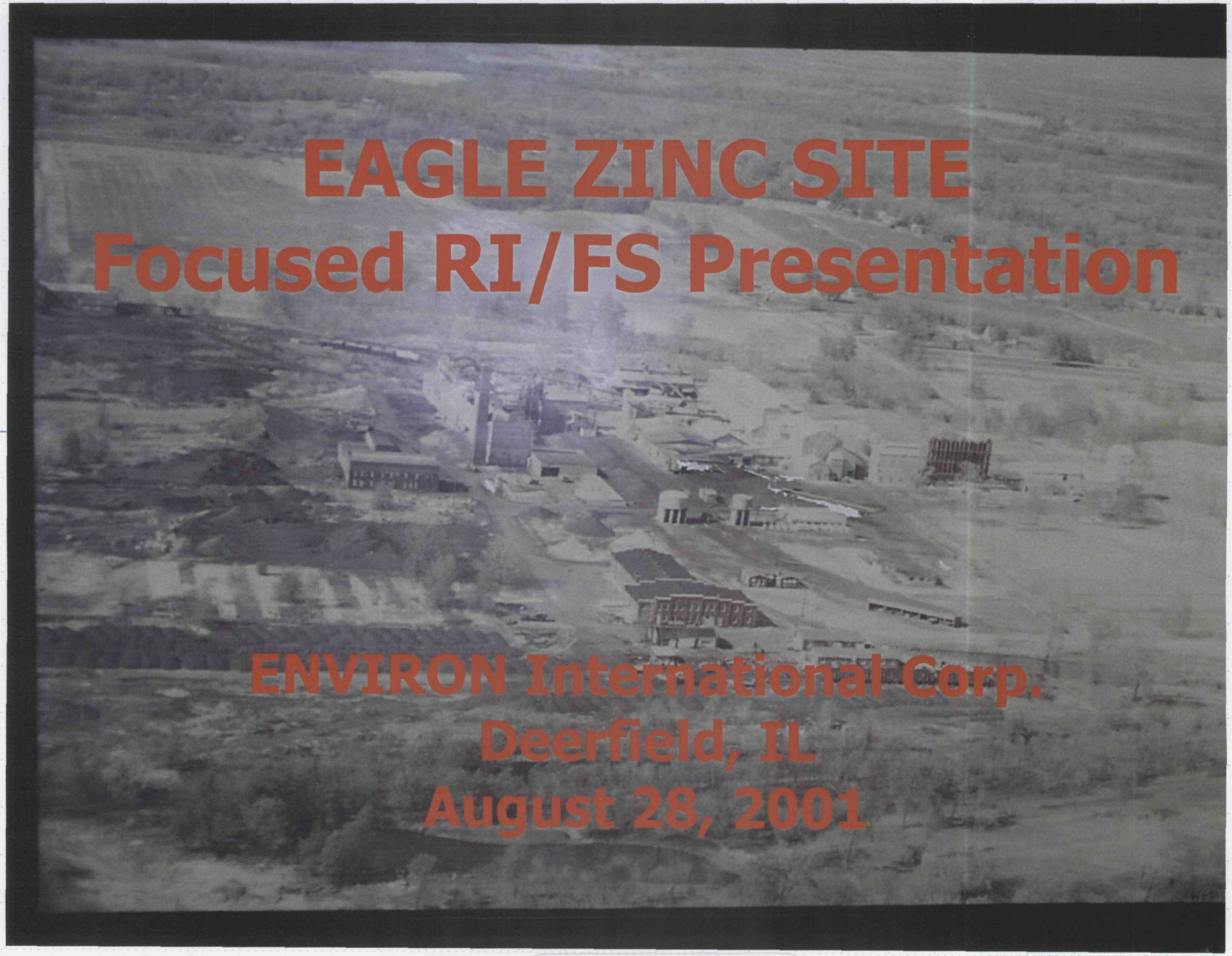
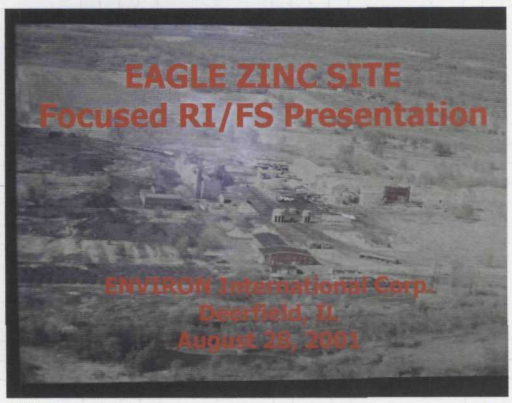




8/28/01 1

EAGLE ZINC SITE
Focused RI/FS Presentation

- Part I: Introduction/Site History
- Part II: Presentation/Evaluation of Site Data
- Part III: Areas of Concern/Conceptual Site Model
- Part IV: Focused RI/FS

8/28/01 ENVIRON 2

PROJECT TEAM

Roy O. Ball, P.E., PhD.	Principal-in-Charge
F. Ross Jones, P.G.	Project Manager
Christopher J. Greco	Project Engineer
Janet E. Kester, PhD.	Principal Toxicologist
Ecologist	To Be Determined

8/28/01 ENVIRON 3

Figure 1 SITE HISTORY

- 1917-1980: Operated by Eagle Picher
- 1980-1984: Operated by Sherwin-Williams
- 1984-Present: Operated by Eagle Zinc Co., a Division of T.L. Diamond Co.

Ref: CERCLA Expanded Site Inspection Report, IEPA, 1993

8/28/01 ENVIRON 4

MANUFACTURING PROCESSES

- Zinc oxide manufactured by Sherwin-Williams, Eagle Picher and Eagle Zinc using "American Process":
  - Mixture of zinc ore and anthracite coal heated in a rotary furnace to vaporize the zinc
  - Heated zinc vapor mixed with O_2 in a combustion chamber to form zinc oxide
  - Suspended zinc oxide is passed through a steel flue/cooling loops
  - Zinc oxide (white powder) filtered out in a bag house
  - Product is refined by heating in a rotary dryer, cooling in a rotary drum and milling
  - Product is packaged in paper bags or super sacks
  - Zinc oxide used in rubber tire industry and paint production
- Until recently, plant made metallic zinc granules through the milling and screening of crude zinc granules
- Rotary residues now screened to make a carbon-rich product that is sold, and potentially reusable slag material
- Limited historical production of lead oxide from lead ore

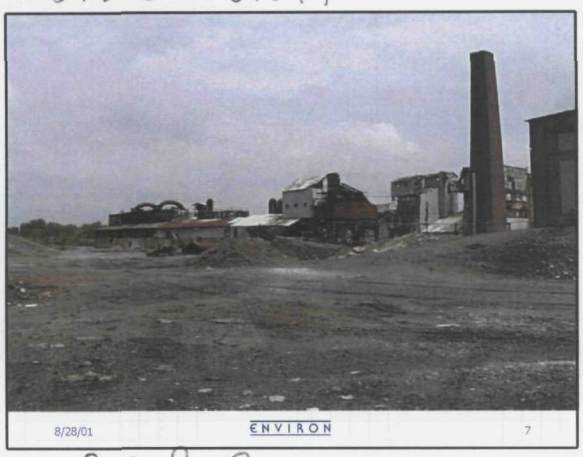
Ref: Storm Water Pollution Prevention Plan, December 2000; CERCLA Expanded Site Inspection Report, IEPA, 1993

8/28/01 ENVIRON 5

Screened by size

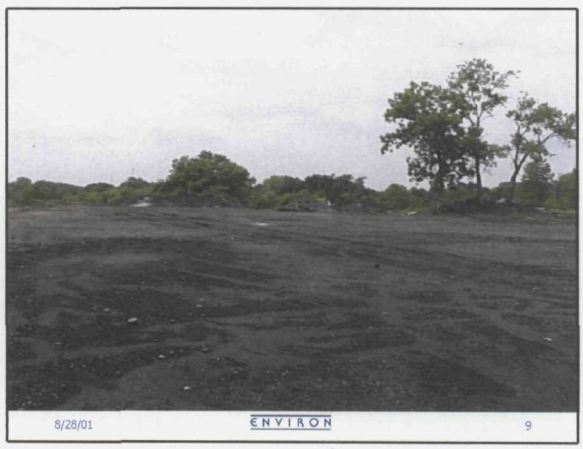
8/28/01 ENVIRON 6

8/15 site visit



w side of mfg area

View to south - middle part of S. edge

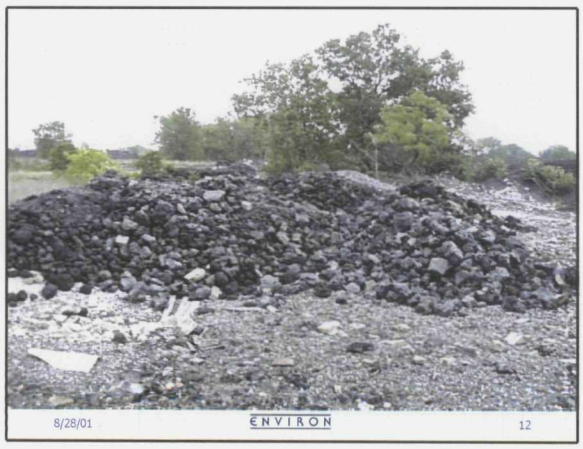


S portion - large pile used to be here

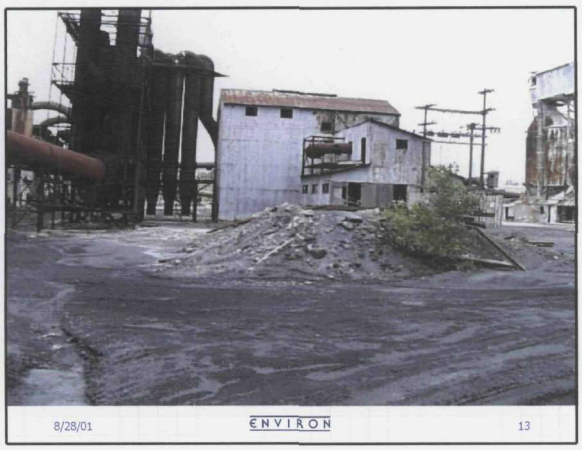
looking west

SW part of property looking SW

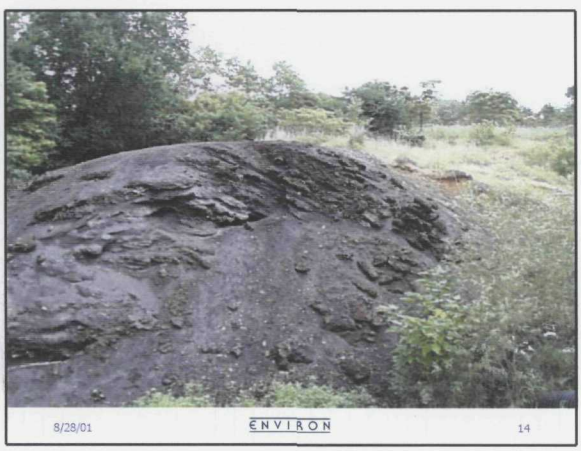
looking N SW corner



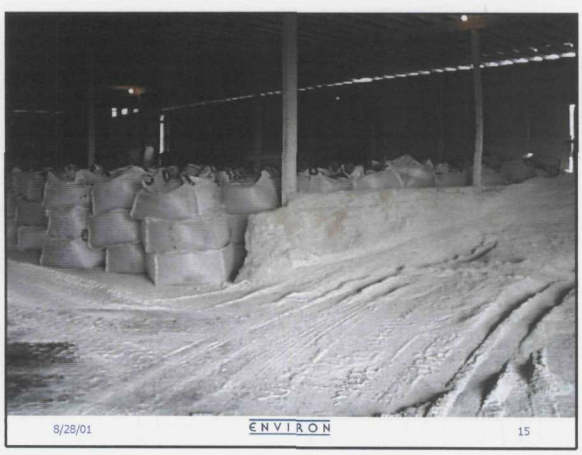
pile of rotary cleanout
W part looking N



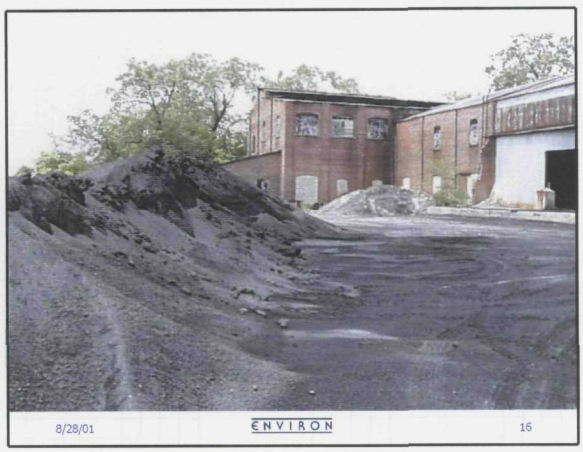
misc debris
near raw mat'ls storage bldg



where SW pond breaks
thru & flows towards west



mixing bldg



8/28/01 ENVIRON 16

carbon fines nat'l sent offsite to zinc plant in PA
- undersized material previously referenced
bldgs for storage

8/28/01 ENVIRON 17

storm water retention pond
looking S
outlet 002

PREVIOUS SITE INVESTIGATIONS

- 1981/1982: Surface water samples collected by IEPA from surface runoff areas at the site
  - Elevated Zn, Cd, Fe, PB and Cu in surface runoff prompted Sherwin-Williams to remove 36 million pounds of residue from 10 acres of the site (Ref: CERCLA Expanded Site Inspection, IEPA, 1993)
- October 1993: CERCLA Expanded Site Inspection conducted by IEPA
  - Collected on-site soil (1), sediment (2) and residue (2) samples
  - Collected off-site soil (18) and sediment (6) samples
- May 1998: samples Residue sampling by Goodwin & Broms, Inc. (GBI), with split collected by IEPA
  - GBI collected 44 on-site soil samples and 68 on-site residue samples from stockpiles
- July 1998: Collection of storm water samples at Outfalls 001 and 002 by GBI, with split samples taken by IEPA
- December 1998: Ground water sampling by GBI, with split samples collected by IEPA

8/28/01 ENVIRON 18

ANALYSIS OF GROUND WATER SAMPLING RESULTS

8/28/01 ENVIRON 19

PRPs presuming that aquifer would be Class I for RI/FS purposes

95% UCL

Figure 2
Figure 3
Figure 4

Groundwater Summary

95

Compounds Exceeding		Significant Difference	Significant Difference from Background			
Class I	Class II	UG/DG	G107	G108	Operable Unit Area	PCOC
Lead	Lead	Sulfate	Iron	Lead	G107	Lead
Iron	Iron		Sulfate	Manganese		Iron
Sulfate	Sulfate		Manganese	Cadmium		Sulfate
Manganese			Cadmium	Zinc		Manganese
Cadmium						Cadmium
Zinc					G108	Zinc

8/28/01 ENVIRON 20

compared to 101&102

G101&102 - they consider upgradient

103, 104, 105 not signif. diff than backgrd.

ANALYSIS OF OFF-SITE SOIL SAMPLING RESULTS

8/28/01 ENVIRON 21

Figure 5

Soil Summary

Compounds Exceeding Soil -> Class I GW	Compounds Exceeding Residential I/I	Significant Difference from B/G	Above Average Conc. in Background Soils SMSA	Above Average Conc. in Background Soils non-SMSA	Operable Unit Area	PCOC
Antimony	Arsenic Beryllium	Arsenic*	Antimony Beryllium	Antimony Beryllium Arsenic*	None	None

8/28/01 ENVIRON 22

1993 to W, S & E
surficial soils
not signif different than IC backgrd.
not a problem w/ offsite soils
includes 2 onsite samples
X104 - MSp area
X110 - SW corner

ANALYSIS OF SEDIMENT SAMPLING RESULTS

8/28/01 ENVIRON 23

sampled for organics
pesticides / PCBs

Figure 6
Figure 7

ingestion/inhalation
std method area

Sediment Summary

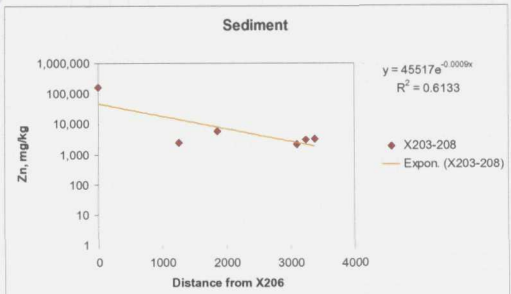
Compounds Exceeding Soil -> Class I GW	Compounds Exceeding Residential I/I	Significant Difference from B/G	Above Average Conc. in Background Soils SMSA	Above Average Conc. in Background Soils non-SMSA	Operable Unit Area	PCOC
Antimony Arsenic Beryllium Nickel Zinc Cadmium Silver Thallium	Arsenic Beryllium Nickel Zinc Cadmium Silver	Cadmium Nickel* Zinc X206 Antimony Arsenic Beryllium Nickel Zinc Silver Thallium	Antimony Arsenic Beryllium Nickel Zinc Cadmium Silver Thallium	Antimony Arsenic Beryllium Nickel Zinc Cadmium Silver Thallium	Drainage Sediments	Antimony Arsenic Beryllium Nickel Zinc Cadmium Silver Thallium

8/28/01 ENVIRON 24

~~1993 to W, S & E~~
~~surficial soil~~
1993
X206 - head of drainage gully
X207 - low lying grass area
X201, 202 - they are considering these backgrd

Cd, Ni, Zn - pr. many COCs for sediments

Zinc Concentrations In Sediments at Radial Distances from X206



8/28/01 ENVIRON 25

ANALYSIS OF STORM WATER SAMPLING RESULTS

8/28/01 ENVIRON 26

Figure 8

Stormwater Summary

Compounds Exceeding 35IAC302 SubB	35IAC302 SubD	Operable Unit Area	PCOC
Chromium (T) Copper (T) Zinc (T)	Zinc (T)	Outfall 002	Chromium (T) Copper (T) Zinc (T)

8/28/01 ENVIRON 27

using existing permit discharge stds to compare stormwater #'s to.

Roy Ball - they envision remedy cutting off stormwater discharge in south part of site

ANALYSIS OF SAMPLING RESULTS FOR ON-SITE SOILS

8/28/01 ENVIRON 28

7/98 - done for TL Diamond

not sure whether soils are native or impacted by surface operations

Figure 9
Figure 10

On-site Soil Summary

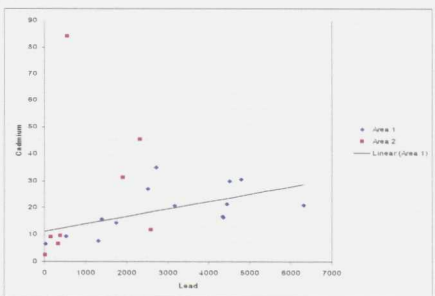
Compounds Exceeding Soil -> Class I GW	Compounds Exceeding Soil -> Class II GW	Areas Exceeding Com./Ind.	Areas Exceeding TCLP Lead	Areas Exceeding TCLP Cadmium	Operable Unit Area	PCOC
Area 1:Pb&Cd Area 2:Pb&Cd Area 3:Pb&Cd Area 4:Pb&Cd	Area 1:Pb Area 2:Pb Area 3:Pb Area 4:Pb	Area 1:Pb Area 4:Pb	Area 1	None	Areas 1-4 Areas 1-4 (for Class I) Area 1	Lead Cadmium Lead - TCLP

main contams

8/28/01 ENVIRON 29

discrete samples
1st grab not containing residual mat'l

Lead Cadmium Correlation For On-Site Soils



8/28/01 ENVIRON 30

compare fairly well

ANALYSIS OF SAMPLING RESULTS FOR RESIDUAL PILES

8/28/01 ENVIRON 31

Figure 11
Figure 12
Figure 13

Residuals Summary

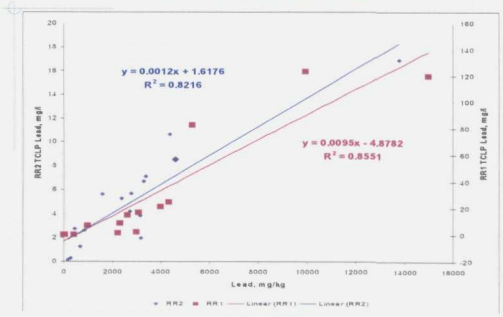
Areas Exceeding TCLP

Lead	Concentration		Operable Unit Area	PCOC
RR1	1036.913961	>	RR1,RR2,MP1	Lead - TCLP
RR2	2805.371766	>		
MP1	911.4640884	>		

above would probably exceedance mean TCLP

8/28/01 ENVIRON

Total Lead to TCLP Correlation for RR1 and RR2



8/28/01 ENVIRON 33

lines of correlation reflect lead #'s from previous studies

comparison to lead models & EPA guidance ongoing

OPERABLE UNITS

- Soils: Areas 1 through 4
- Sediments: Southwestern and northeastern drainage channels and receiving water bodies (Hillsboro Lake and Mid Fork Shoal Creek)
- Ground water: Southwest area of site and adjacent off-site areas
- Residue Materials: RR1, RR2 and MP1

8/28/01 ENVIRON 34

onsite soils

DATA GAPS

- Soils: Additional characterization/ delineation of metals concentrations required in Areas 1-4
- Sediments: Off-site characterization/delineation of metals concentrations in drainage ditch and receiving water sediments for Outfalls 001 and 002
- Ground Water: Additional characterization/ delineation in southwest part of site, in area of monitoring wells G107 and G108

8/28/01 ENVIRON 35

CONCEPTUAL SITE MODEL: MEDIA AFFECTED AND PCOCs

Soils	Sediments	Ground Water	Residues
Lead	Antimony	Cadmium	TCLP-Lead
TCLP-Lead	Arsenic	Lead	
Cadmium	Beryllium	Manganese	
	Cadmium	Iron	
	Silver	Sulfate	
	Thallium		
	Zinc		

8/28/01 ENVIRON 36

CONCEPTUAL SITE MODEL: EXPOSURE ROUTES

- **Exposure Routes:**
  - On-site soils: employee (inhalation, ingestion, dermal)
  - On-site residues: employee (inhalation, ingestion, dermal)
  - On-site ground water: construction worker (inhalation, ingestion, dermal)
  - Off-site ground water: incidental residential exposure
  - Off-site sediments: secondary use residential, potential ecological impacts

8/28/01 ENVIRON 37

onsite ecological?

PRESUMPTIVE REMEDY RI/FS SOW OUTLINE

- **RI/FS Work Plan**
- **RI Scope**
- **Baseline Risk Assessment**
- **RI Report**
- **Presumptive Remedy FS**
- **Interim Remedial Measures**

8/28/01 ENVIRON 38

potential
IRMs - site security
- stopping stormwtr flow to south

PRESUMPTIVE REMEDY RI/FS SOW

- **RI/FS Work Plan**
  - Evaluation of Pre-Existing Site Information and Reports
  - FSP
  - QAPP/Data Management Plan
  - HASP
  - Ecological Evaluation Plan
  - Baseline Human Health Risk Assessment Plan
  - Community Relations Plan

8/28/01 ENVIRON 39

PRESUMPTIVE REMEDY RI/FS SOW

- **RI Scope**
  - Obtain off-site access
  - On-Site Soil Investigation
  - Sediment Investigation
  - Ground Water Investigation
  - Sampling of Residual Piles
  - Ecological Evaluation

ON-SITE SOIL INVESTIGATION

- Objective: Characterize and delineate extent of metals in native soil below residual materials
- Complete shallow soil borings to undisturbed soil in Areas 1-4
- On-site screening of soil for metals using XRF
- Real time geostatistical analysis to maximize sample coverage
- Laboratory analysis of selected samples for PCOCs

SEDIMENT INVESTIGATION

- Objective: Characterize the nature and extent of metals impacts on sediments in drainageways receiving storm water discharges from the site
- Screening of sediments for metals using XRF
- Collection of approx. 19 sediment samples for laboratory analysis for PCOCs
- Target sediment accumulation areas or representative locations; collect as transect composites

GROUND WATER INVESTIGATION

- Objective: Determine hydraulic relationships between ground water and surface water, ground water flow pattern, and metals concentrations in SW portion of site
- Install, survey, sample and measure water levels in up to 10 temporary monitoring wells
- Convert approx. 4 to permanent wells based on water quality and piezomentric data
- Sample all permanent monitoring wells for PCOCs

8/28/01 ENVIRON 43

RESIDUAL PILE SAMPLING

- Objective: Evaluate toxicity characteristics of residual materials at the site
- Collect representative samples in accordance with SW846 procedures
- Testing of samples for TCLP Metals

8/28/01 ENVIRON 44

for onsite/offsite disposal designation

ECOLOGICAL EVALUATION

- Identify and evaluate Environmentally Sensitive Areas (ESAs)
- Identify potential contaminant migration pathways to ESAs
- Evaluate potential ecological impacts to ESAs
- Recommend further investigations as appropriate

8/28/01 ENVIRON 45

PRESUMPTIVE REMEDY FOR METALS-IN-SOIL

- USEPA has established preferred treatment technologies for metals in soils
- For "Principal Threat" wastes: Reclamation/recovery or immobilization
- For "Low-Level Threat" wastes: Containment
- May be combined with other technologies, as appropriate
- In focused FS, consideration may be limited to "no action" and presumptive remedy technologies

SUMMARY

- Focused RI/FS
- Presumptive Remedies
- Potential IRMs during RI/FS

FOCUSED RI/FS

Focused RI/FS to address metals concentrations previously detected in on-site soils, on-site ground water in southwest part of site (and adjacent off-site areas), and off-site sediments.

Three types of residues had samples above TCLP-lead limit.

No additional activities associated with off-site soils, storm water, or ground water quality in central and northern areas of site.

PRESUMPTIVE REMEDIES

Presumptive remedies likely applicable:

- recovery/reclamation
- stabilization
- Containment, or
- combination thereof.

8/28/01 ENVIRON 49

POTENTIAL IRMs

- ~~building demolition~~
- ~~manufacturing area paving~~
- additional erosion controls
- surface drainageway construction
- installation of fencing
- beneficial reuse of stockpile materials.

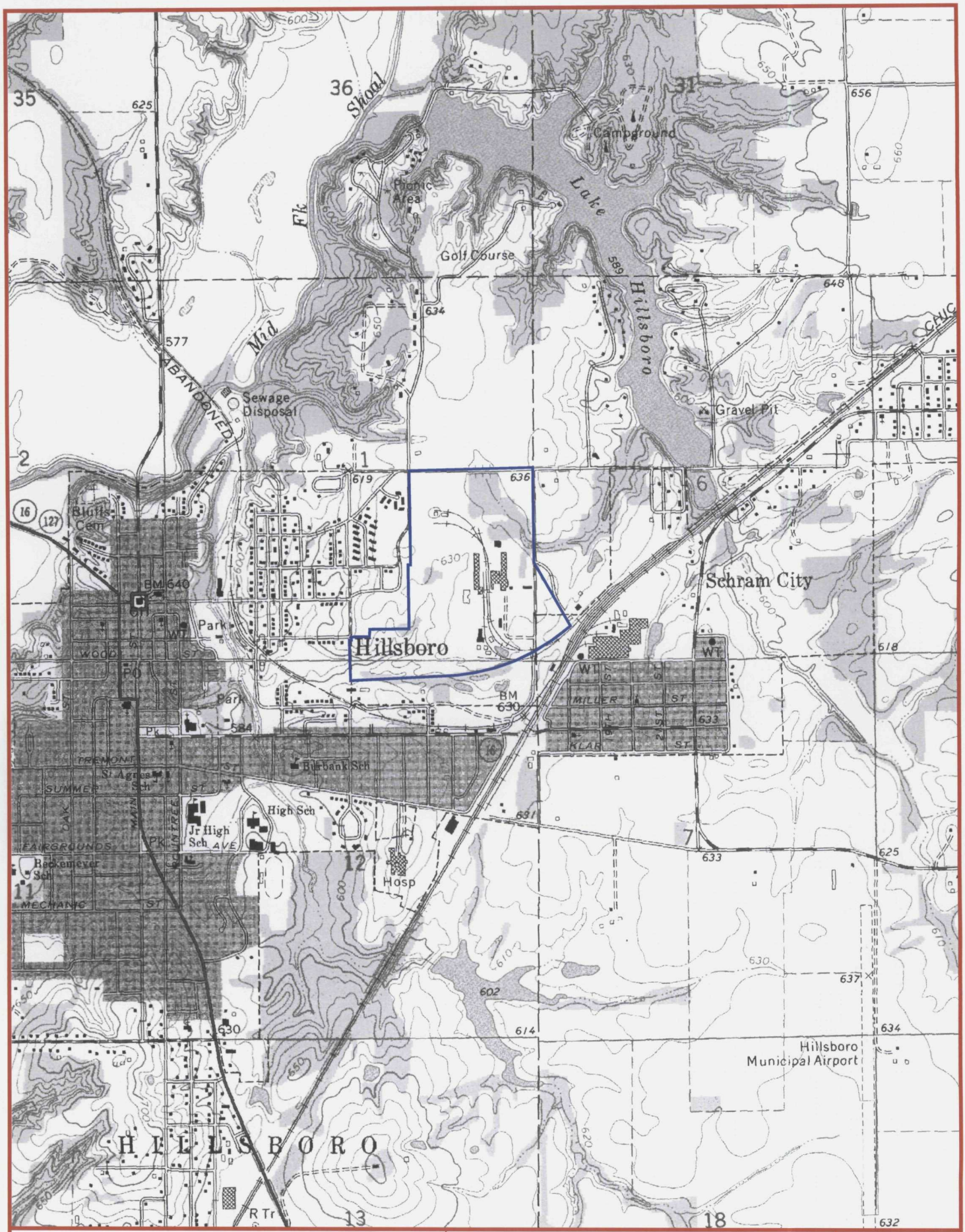
may be similar

8/28/01 ENVIRON 50

Pile reconsolidation a possibility (earlier in RI/FS)
- once sampling is done

Makes economic sense to separate pile materials.

FIGURES



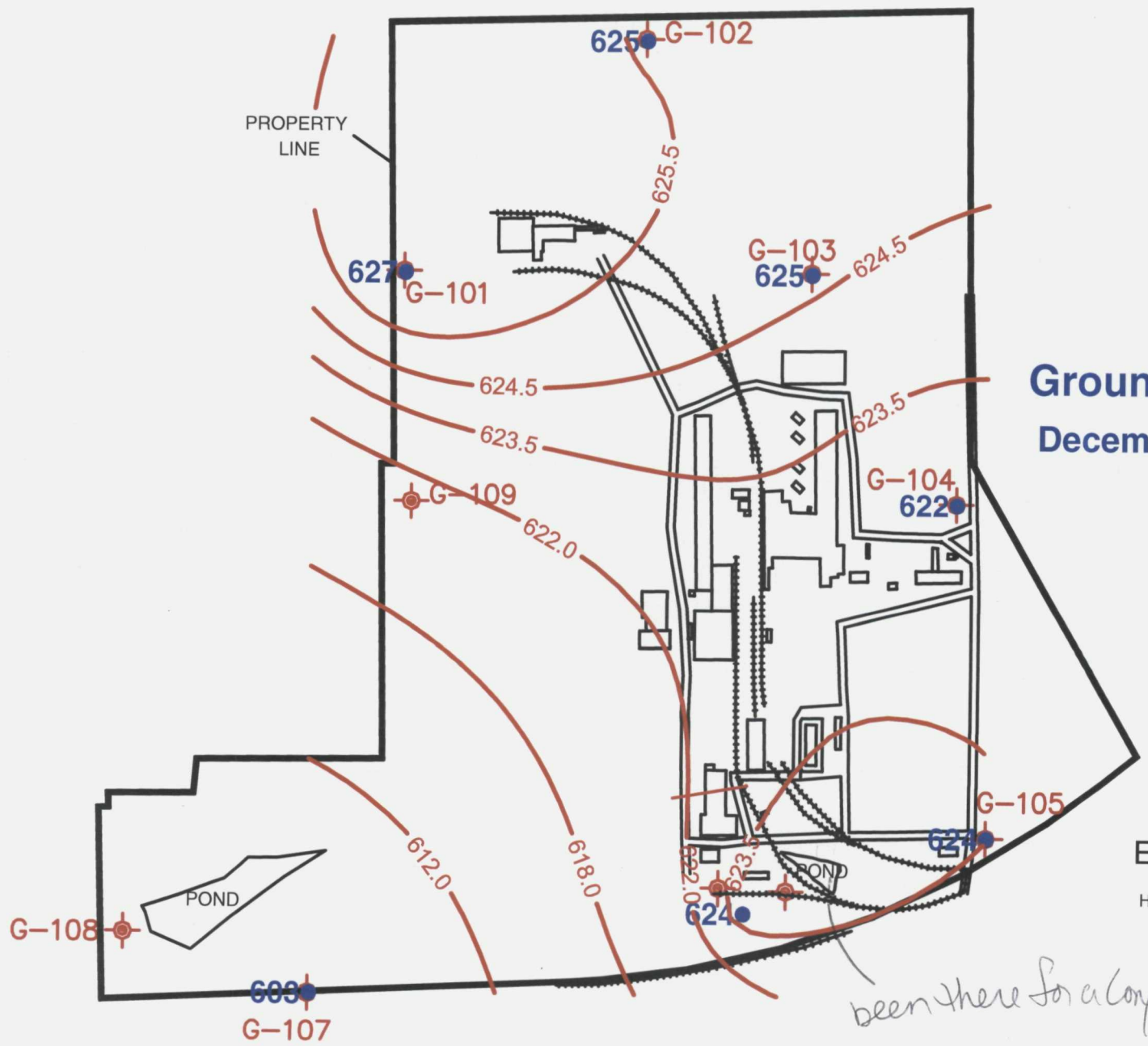
ENVIRON

740 Waukegan Road, Suite 401, Deerfield, IL 60015

Site Location Map
Eagle Zinc
Hillsboro, Illinois

Figure
1

Drafter:	Date:	Contract Number:	Approved:	Revised:



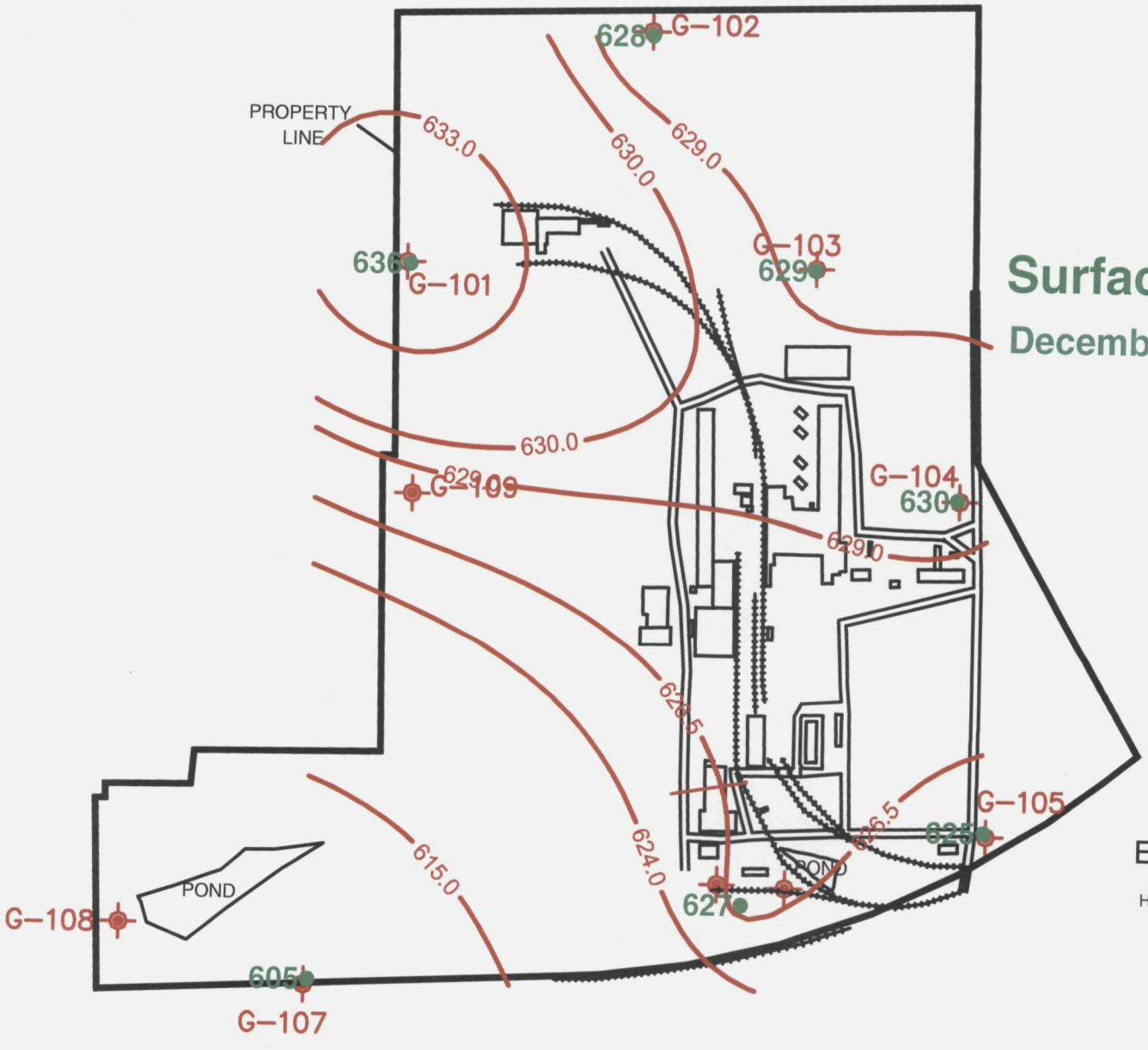
Ground Water Elevation

December 1998

EAGLE ZINC

HILLSBORO, ILLINOIS

Figure 2



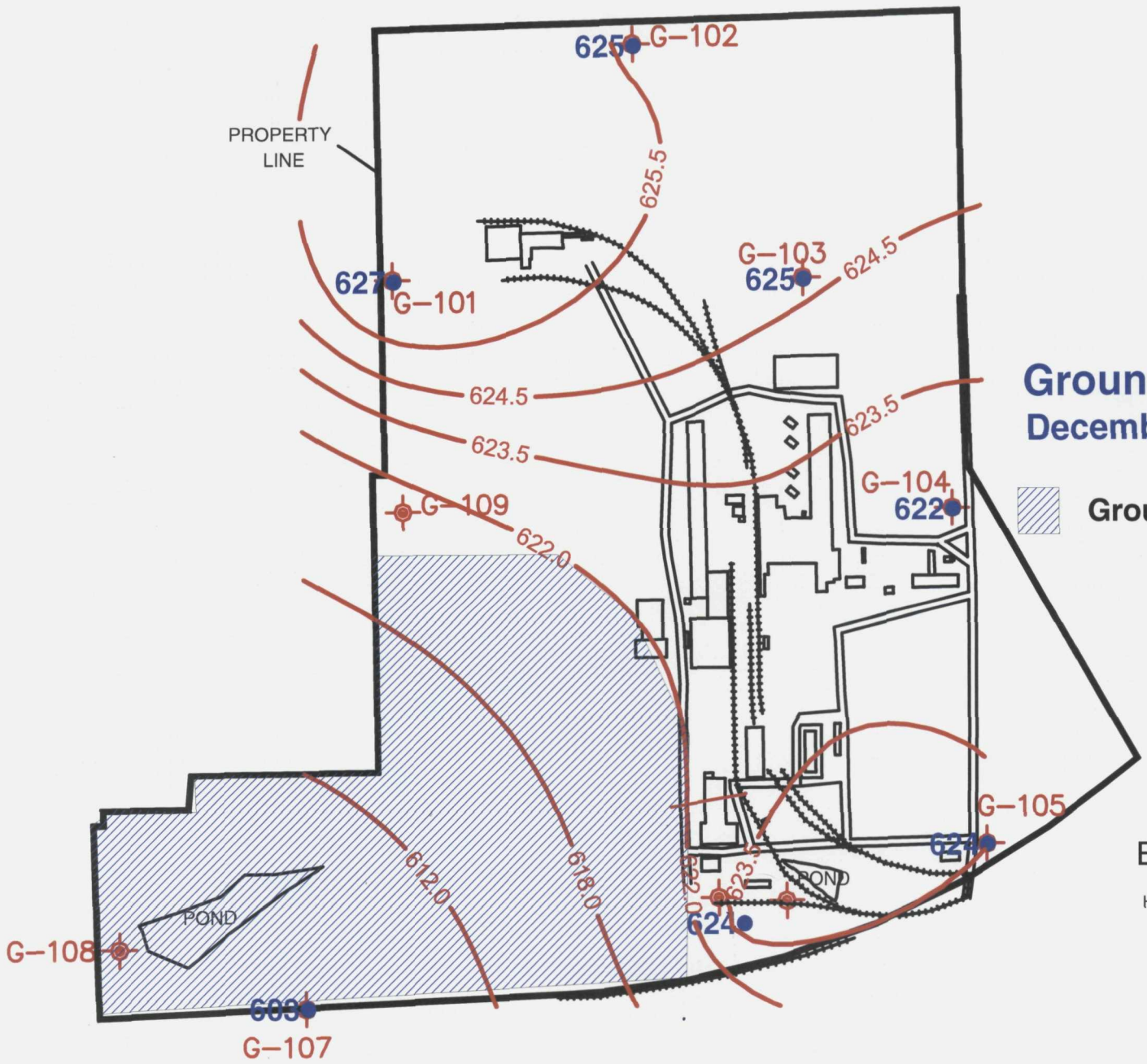
Surface Elevations

December 1998

EAGLE ZINC

HILLSBORO, ILLINOIS

Figure 3



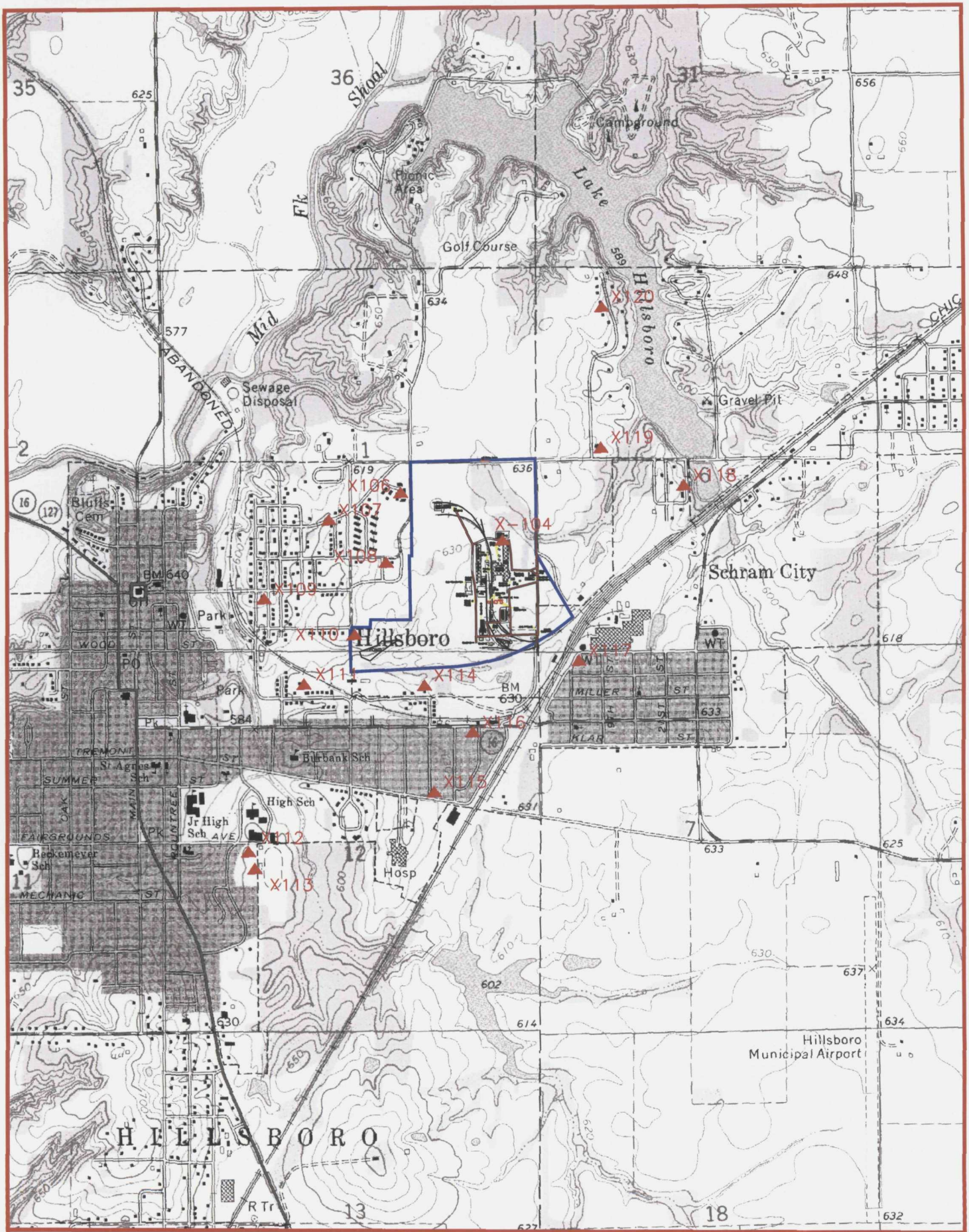
Ground Water Elevations
December 1998

Groundwater Operable Unit

EAGLE ZINC

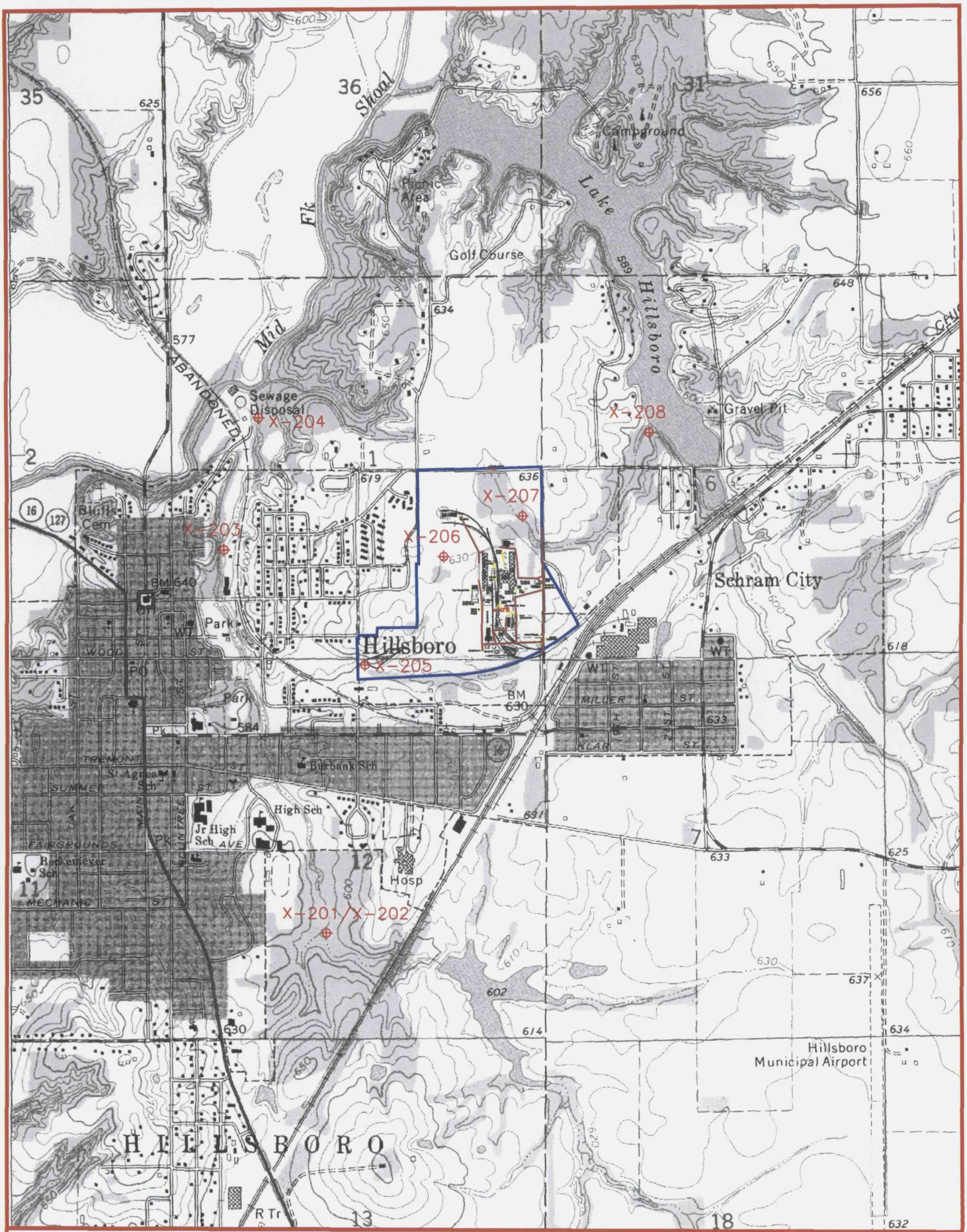
HILLSBORO, ILLINOIS

Figure 4



ENVIRON 740 Waukegan Road, Suite 401, Deerfield, IL 60015	1993 Soil Sample Locations Eagle Zinc Hillsboro, Illinois	Figure 5

Drafter:	Date:	Contract Number:	Approved:	Revised:



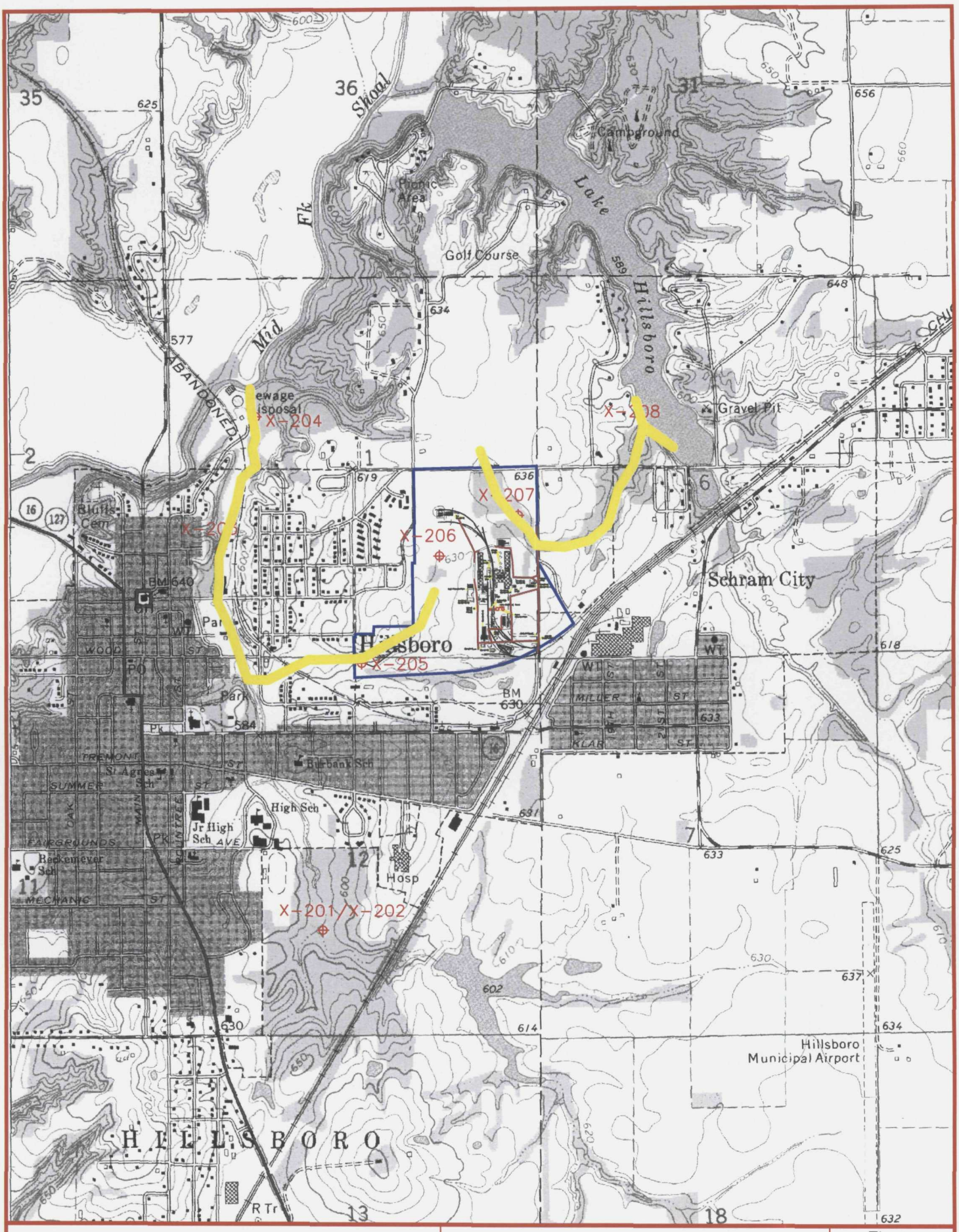
ENVIRON

740 Waukegan Road, Suite 401, Deerfield, IL 60015

1993 Sediment Sample Locations
Eagle Zinc
Hillsboro, Illinois

Figure
6

Drafter:	Date:	Contract Number:	Approved:	Revised:



ENVIRON 740 Waukegan Road, Suite 401, Deerfield, IL 60015	Operable Unit for Sediments Eagle Zinc Hillsboro, Illinois	Figure 7

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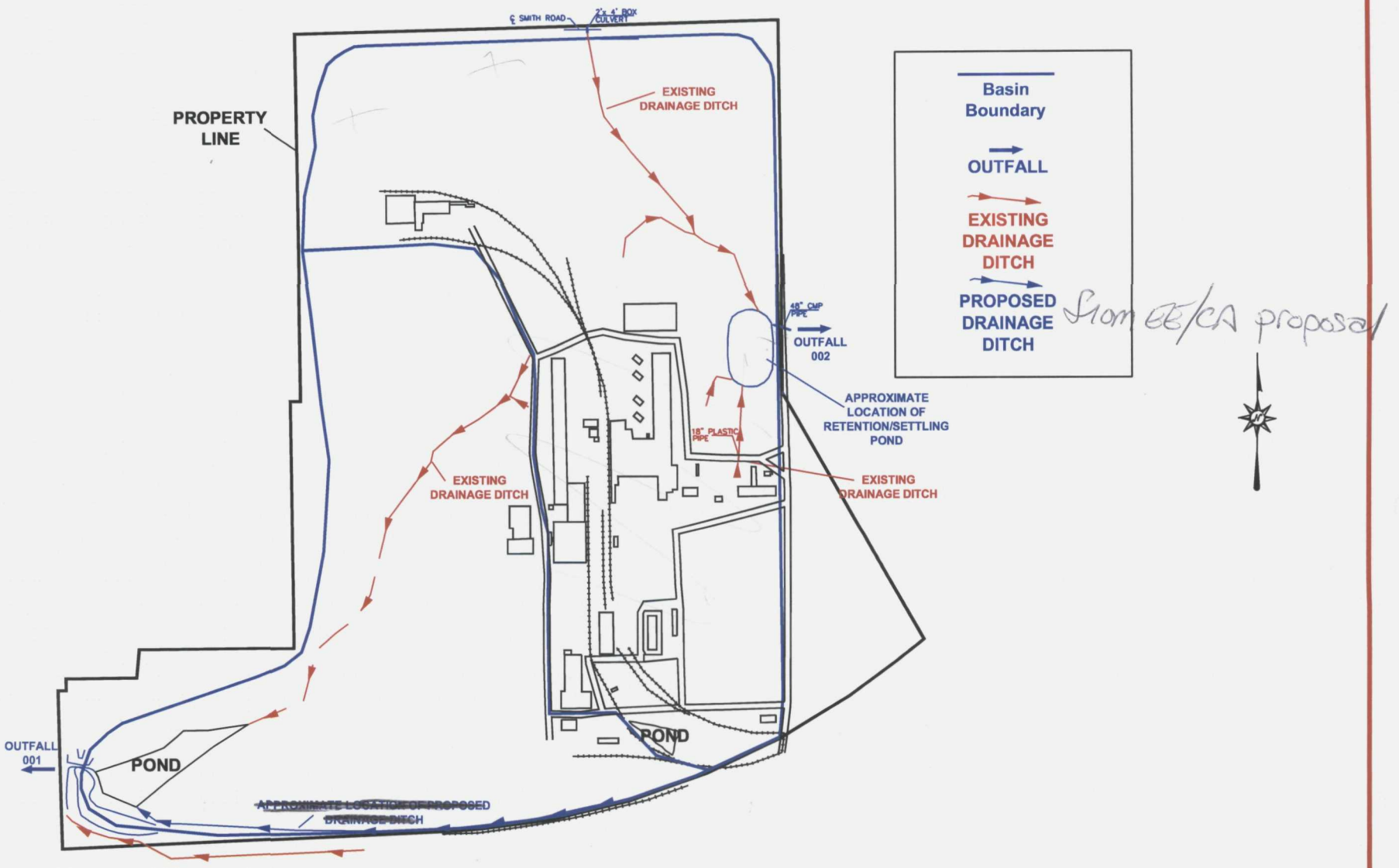
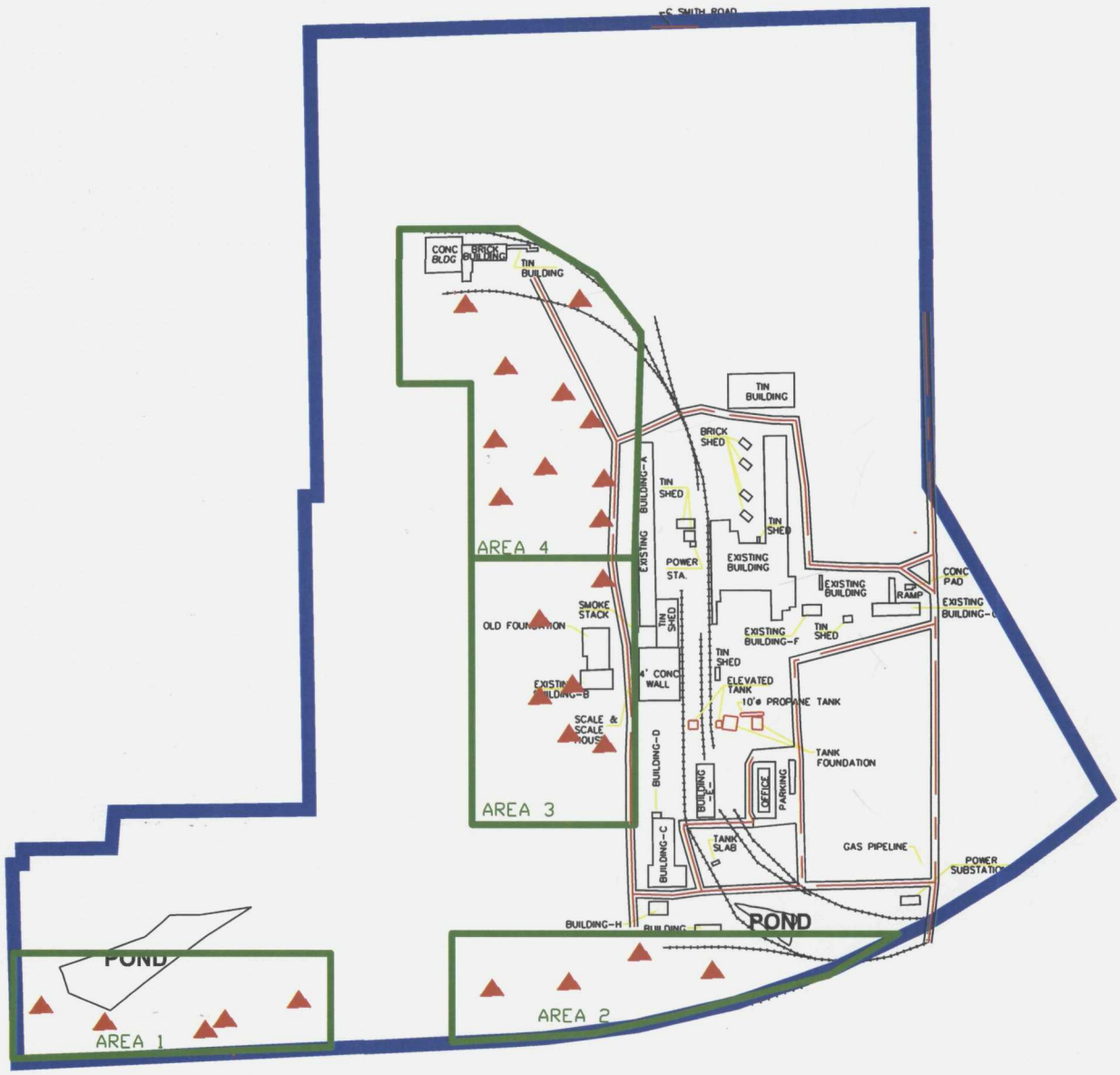


ENVIRON
740 Waukegan Road, Suite 401, Deerfield, IL 60015

Eagle Zinc
Hillsboro, Illinois
December 1999

Figure
8

Drafter: | Date: | Contract Number: | Approved: | Revised:



ENVIRON

740 Waukegan Road, Suite 401, Deerfield, IL 60015

On-site Soil Samples
Eagle Zinc
Hillsboro, Illinois

Figure
9

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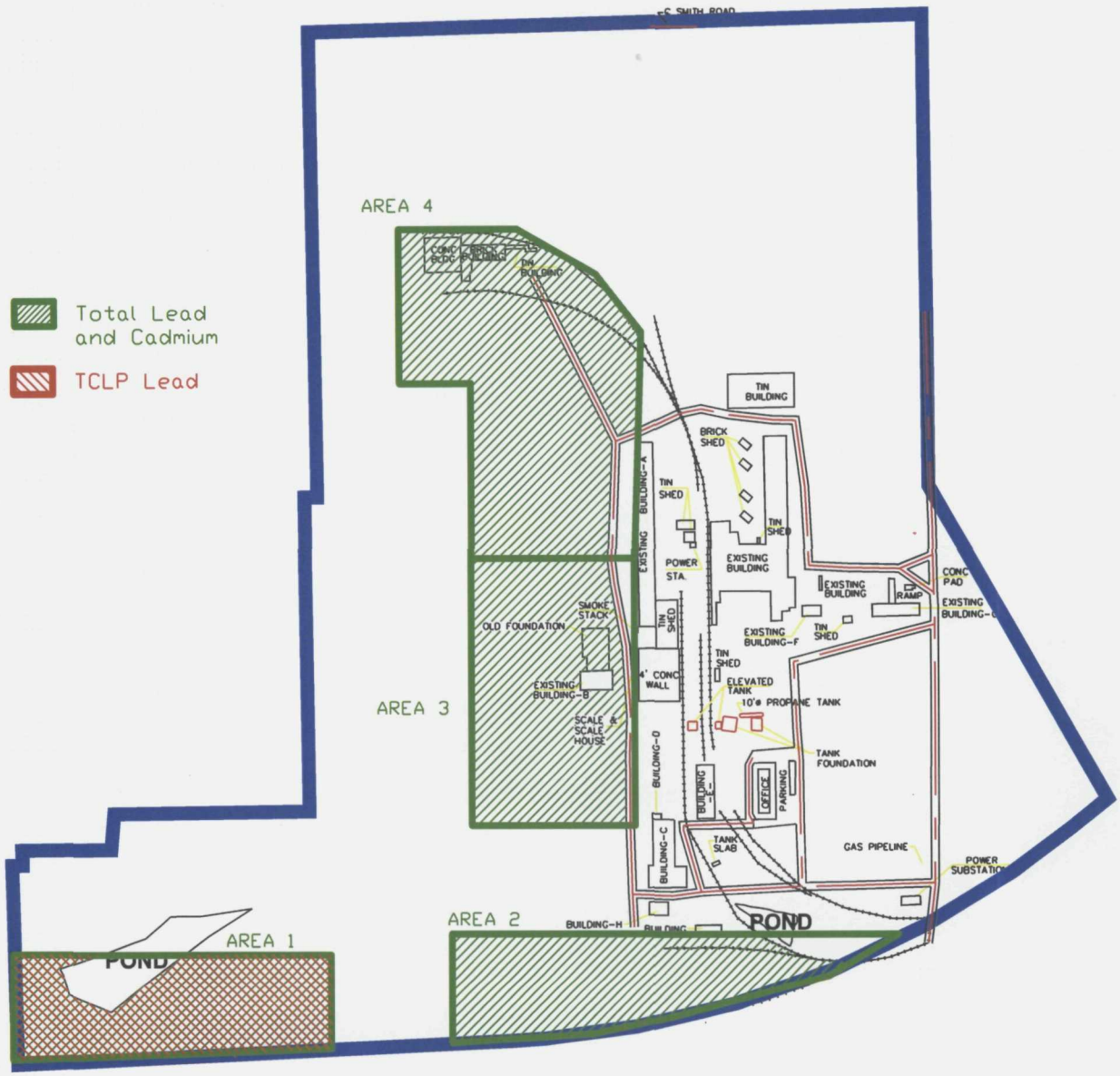
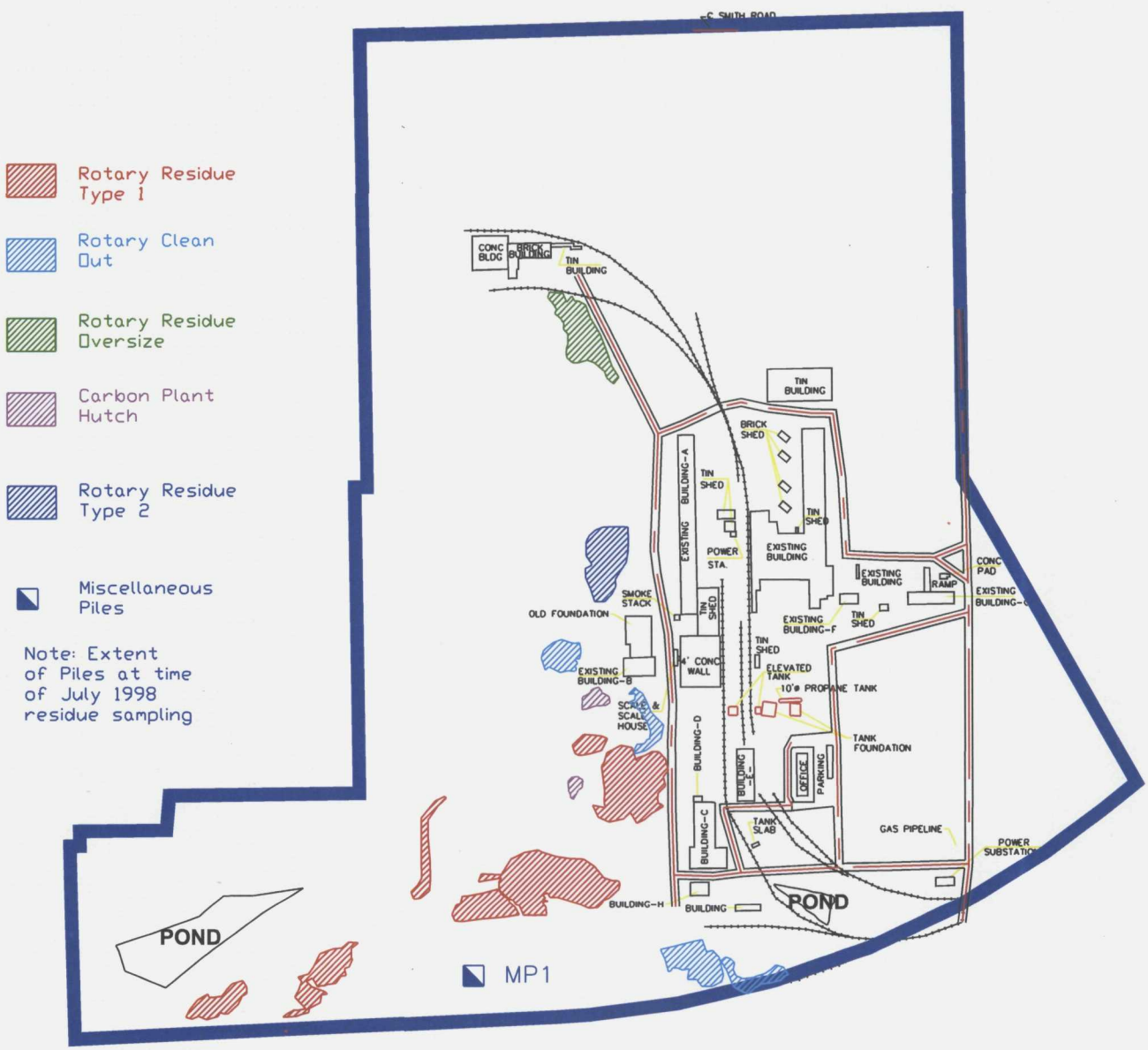


ENVIRON 740 Waukegan Road, Suite 401, Deerfield, IL 60015	On-site Soil Operable Units Eagle Zinc Hillsboro, Illinois	Figure 10

Drafter:	Date:	Contract Number:	Approved:	Revised:



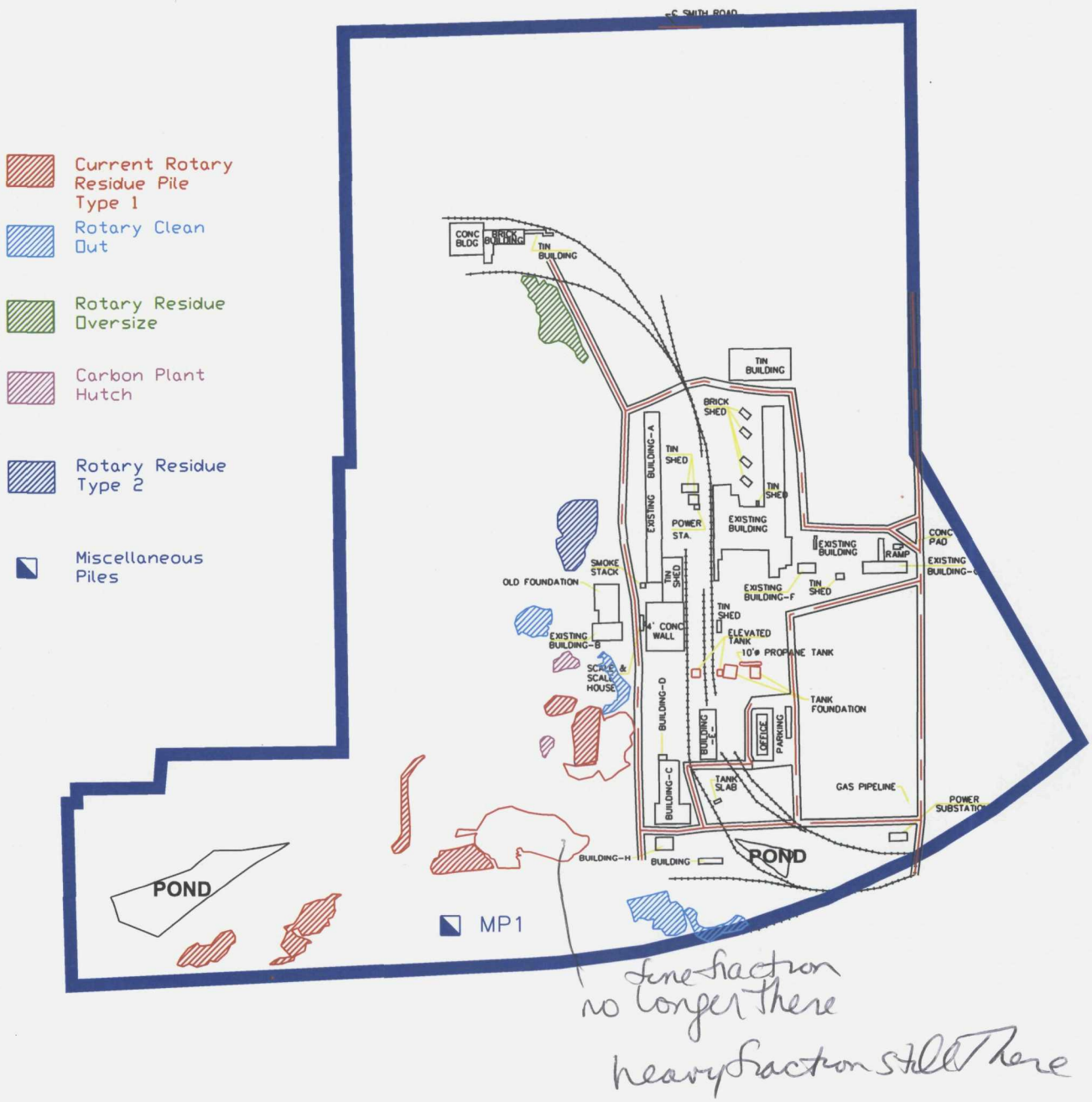
ENVIRON

740 Waukegan Road, Suite 401, Deerfield, IL 60015

Residual Piles
Eagle Zinc
Hillsboro, Illinois

Figure
11

Drafter: Date: Contract Number: Approved: Revised:

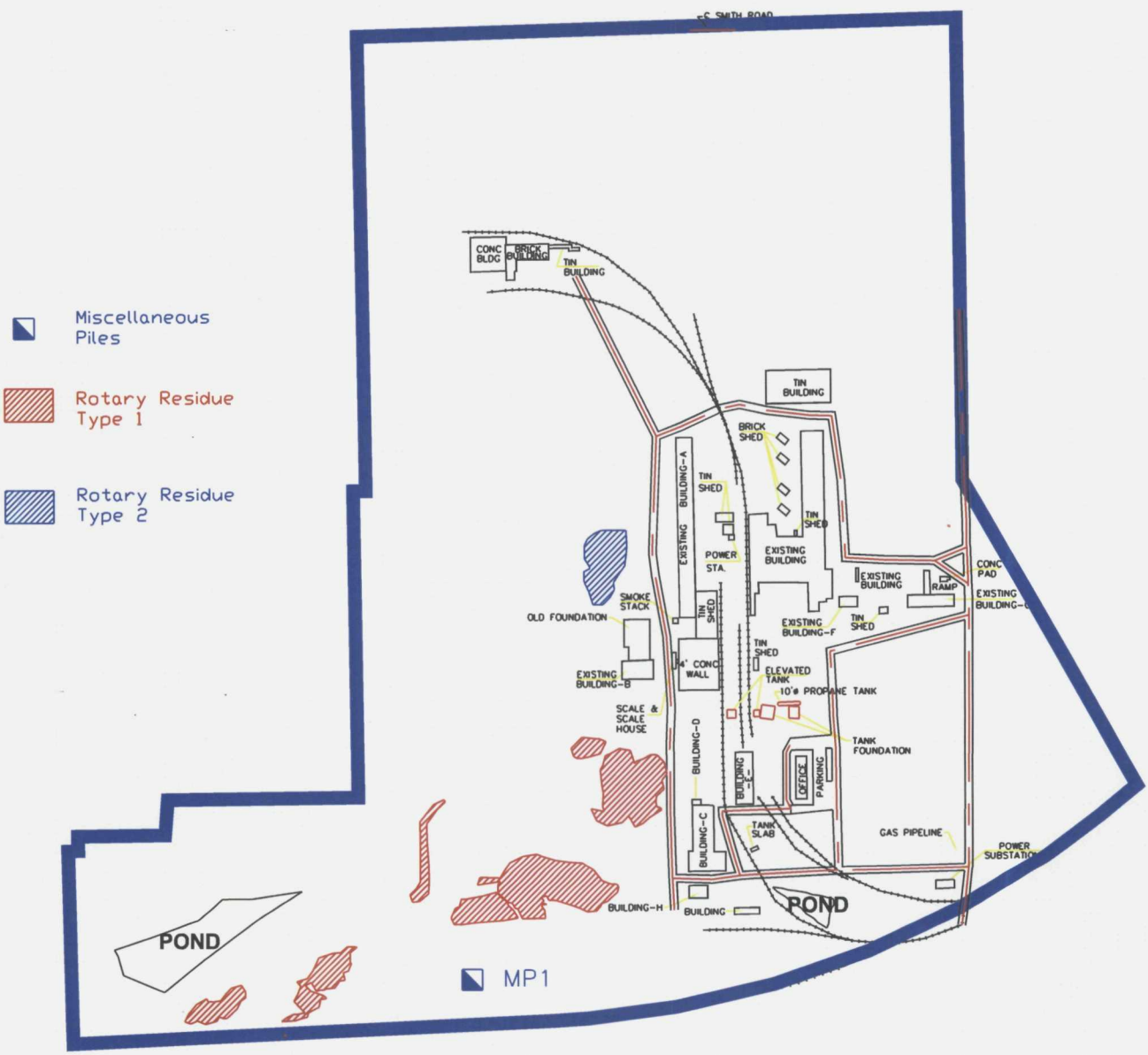


fine fraction no longer there

heavy fraction still there

ENVIRON 740 Waukegan Road, Suite 401, Deerfield, IL 60015	Current Residual Piles August 2001 Eagle Zinc, Hillsboro, IL	Figure 12

Drafter:	Date:	Contract Number:	Approved:	Revised:



ENVIRON

740 Waukegan Road, Suite 401, Deerfield, IL 60015

Residual Piles Operable Units
Eagle Zinc
Hillsboro, Illinois

Figure
13

Drafter: Date: Contract Number: Approved: Revised: